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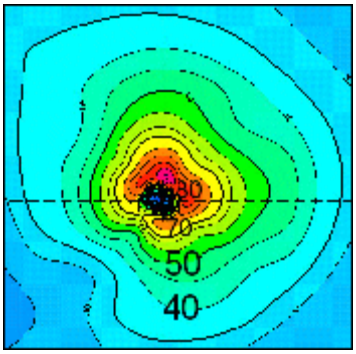
Atlantic Oceanographic and Meteorological Laboratory

Specializing in hurricanes and open and coastal ocean research



Hurricane Carlotta wind analysis showing wind speed in knots


Deployment of surface drifting buoy


NOAA's P-3 Hurricane Hunters in formation

1315 East West Hwy
Silver Spring, MD 20910
301-713-1671
www.oar.noaa.gov

What does the Atlantic Oceanographic and Meteorological Laboratory do for the nation?

With an estimated 40 million Americans living in coastal regions of the Eastern United States, it is essential that we understand how the human population affects the oceans and the role the ocean plays in our lives. Human-related discharges ranging from waste water to increased levels of freshwater run-off can significantly affect the coastal marine ecosystems we depend on economically. The temperature and rate at which ocean water circulates directly relates to global climate and long term weather patterns. The gradual north and south oscillation of warm waters in the Atlantic is strongly linked to increased or decreased hurricane activity.

Scientists at the Atlantic Oceanographic and Meteorological Laboratory (AOML) study the relationships between ocean and atmosphere by conducting research in both near shore and open ocean environments. They cooperate with other federal, state, and local authorities to maximize research knowledge for use in economically and environmentally important projects. AOML also provides and interprets oceanographic data collected via ships, satellites, drifting buoys and floats, and conducts research relevant to annual-to-decadal climate change and coastal ecosystems. This research includes the dynamics of the ocean, its interaction with the atmosphere, and its role in climate and climate change. AOML research improves the understanding and prediction of hurricane motion and intensity change. A key to this work is the annual hurricane field program, supported by the NOAA Aircraft Operation's Center research/reconnaissance aircraft.

Recent Accomplishments:

- AOML addresses the problem of rapid hurricane intensification through detailed airborne observations of the atmospheric boundary layer and upper ocean using dropsondes, microwave remote sensing, and expendable oceanographic probes. ***Payoffs: The forecast system currently has limited skill in predicting rapid intensification, which can transform unremarkable hurricanes into an engine of devastation overnight. Timely warning of rapid intensification ahead of an impending landfall is the key to mitigation of the inevitable large-scale property damage and prevention of extensive mortality.***

- AOML provides real-time analysis and display of conditions, notably surface winds and radar images, observed by aircraft flying in hurricanes - used for issuing warnings. ***Payoffs: Knowledge of the on-set of gale force winds helps emergency managers decide when to issue warnings and evacuations as well as where to anticipate the most damage.***

- AOML operates a GOOS (Global Ocean Operating System) Center that collects upper ocean data from a wide variety of platforms, transmits the data to operational forecast centers and performs quality control before producing the data to research scientists. ***Payoffs: The data are a critical component of the climate forecast activities that have been shown to be of great economic benefit both to the nation and the international community.***

- AOML is a principal player in the NOAA/OGP Carbon Cycle Science Program, which aims to improve forecasts of atmospheric CO2 levels by measuring the air-sea CO-2 fluxes and oceanic inventories of anthropogenic(or excess) CO-2. ***Payoffs: The oceans sequester roughly 1/3 of the excess CO2 released by fossil fuel burning. A quantitative knowledge of its uptake capacity and changes thereof is imperative for future energy policy, mitigation strategies, and climate research.***

- During the recent sewage spill in Miami, AOML provided critical offshore current measurements to municipal authorities and Health Dept. to determine regional beach closures as a public protective measure against sewage contamination. ***Payoffs: Helping to prevent public health problems and minimize unnecessary lost revenue from beach closures, an estimated millions of dollars per day.***

What's next for AOML?

AOML will conduct increasingly interdisciplinary research with stronger links between the three major laboratory themes: oceans and climate, regional and coastal waterways, and tropical meteorology. AOML has a firmly established role as leader in research in all three areas, particularly for research focused in the Atlantic Ocean, including the Intra-Americas Sea (Caribbean and Gulf of Mexico) and Florida coastal areas. AOML is the custodian of major oceanographic and hurricane data sets and is a center for their dissemination. In addition to continuing work, general new avenues that could be potential future projects include:

- A model system for assisting coastal infrastructure groups in responding to infrastructure failures
- Expanded Research in the Intra-Americas Sea
- Southeastern US regional research covering all three AOML theme areas
- Expanded use of Remote Sensing Technology - including greater use of the Coastwatch satellite data system

Research Partnerships:

AOML has research partnerships with all components of NOAA; several universities, especially the University of Miami; many other federal agencies including EPA, Army Corps of Engineers, NASA, and the Office of Naval Research; and several foreign research organizations (e.g., IFREMER, the French Oceanographic Research Institute)

Budget and Staff:

AOML is a $13.9 million laboratory ($8.3 million in NOAA base), with 156 staff, including 107 federal employees, 4 NOAA Corps officers, 10 contract employees and 35 university employees.

For more information, contact:
Dr. Kristina Katsaros, Director
4301 Rickenbacker Causeway
Miami, FL 33149
(305) 361-4300
http://www.aoml.noaa.gov